CLAIMS

What is claimed is:

1   1.   A satellite communications system, comprising:

2   a ground station, including communications equipment

3   and an antenna, located at a position on the earth;

4   a plurality of satellites in orbits around the earth

5   having apogees and perigees, each of the satellites having

6   communications equipment thereon configured to communicate

7   with the ground station only during a predetermined portion

8   of the satellite's orbit proximate to apogee, the orbits of

9   the plurality of satellites being configured to form at

10   least two ground tracks on the earth displaced from each

11   other longitudinally, each of the ground tracks repeating

12   daily and having a number of active arcs, each active arc

13   corresponding to the portion of the orbit of each satellite

14   during which the communications equipment on the satellite

15   is enabled to communicate with the ground station, the

16   orbits of the plurality of satellites being further

17   configured such that at all times there are at least two of

18   the satellites in each of the active arcs and such that at

19   all times each of the satellites in any one of the active

20   arcs is separated by at least a predetermined angle, as

21   observed from the ground station, from each other satellite

22   in the same active arc and from any satellite in any other

23   active arc.

1   2.   A system according to claim 1, wherein the orbit of

2   each of the plurality of satellites has a mean motion that

3   is one of 2, 3 and 4.

1 3. A system according to claim 1, wherein the orbits of
2 each of the plurality of satellites is inclined at critical
3 inclination.

1 4. A system according to claim 1, wherein the argument of
2 perigee of the orbits of each of the plurality of
3 satellites is in the range of 195 degrees to 345 degrees
4 for apogees in the northern hemisphere and in the range of
5 15 degrees to 165 degrees for apogees in the southern
6 hemisphere.

1 5. A system according to claim 1, wherein each of the
2 plurality of satellites has throughout its orbit an orbital
3 height lower than a height necessary for geostationary
4 orbits.

1 6. A system according to claim 1, wherein the plurality
2 of satellites are equally spaced in mean anomaly within
3 their respective ground tracks.

1 7. A system according to claim 1, wherein the orbits of
2 the plurality of satellites are further configured such
3 that the portion of the orbits during which the
4 communications equipment on the satellites is enabled to
5 communicate, is separated from the equatorial plane of the
6 earth by at least a predetermined amount.

1 8. A system according to claim 1, wherein the
2 communications equipment on the plurality of satellites is
3 further configured to communicate at frequencies allocated
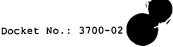4 to geostationary satellites.

1   9.   A system according to claim 1, wherein each of the

2   plurality of satellites has a power system configured to

3   generate a first amount of power when the communications

4   equipment on the satellite is enabled and a second amount

5   of power more than the first amount of power when the

6   communications equipment is not enabled, to store excess

7   power generated when the communications equipment is not

8   enabled, and to enable the communications equipment with

9   both the stored excess power and the generated first amount

10 of power.

1   10.   A constellation of satellites, comprising:

2   a plurality of satellites in orbits around the earth

3   having apogees and perigees, each of the satellites having

4   communications equipment thereon configured to communicate

5   only during a predetermined portion of the satellite's

6   orbit proximate to apogee, the orbits of the plurality of

7   satellites being configured to form at least two ground

8   tracks on the earth displaced from each other

9   longitudinally, each of the ground tracks repeating daily

10 and having a number of active arcs, each active arc

11 corresponding to the portion of the orbit of each satellite

12 during which the communications equipment on the satellite

13 is enabled to communicate, the orbits of the plurality of

14 satellites being further configured such that at all times

15 there are at least two of the satellites in each of the

16 active arcs and such that at all times each of the

17 satellites in any one of the active arcs is separated by at

18 least a predetermined angle, as observed from the earth,

19 from each other satellite in the same active arc and from

20 any satellite in any other active arc.

1 11. A constellation according to claim 10, wherein the
2 orbit of each of the plurality of satellites has a mean
3 motion that is one of 2, 3 and 4.

1 12. A constellation according to claim 10, wherein the
2 orbit of each of the plurality of satellites is inclined at
3 critical inclination.

1 13. A constellation according to claim 10, wherein the
2 argument of perigee of the orbits of each of the plurality
3 of satellites is in the range of 195 degrees to 345 degrees
4 for apogees in the northern hemisphere and in the range of
5 15 degrees to 165 degrees for apogees in the southern
6 hemisphere.

1 14. A constellation according to claim 10, wherein each of
2 the plurality of satellites has throughout its orbit a
3 orbital height lower than a height necessary for
4 geostationary orbits.

1 15. A constellation according to claim 10, wherein the
2 satellites in each of the two or more ground tracks are
3 equally spaced in mean anomaly.

1 16. A constellation according to claim 10, wherein the
2 orbit of each of the plurality of satellites is further
3 configured such that the portion of the orbits during which
4 the communications equipment on the satellites is enabled
5 to communicate, is separated from the equatorial plane of
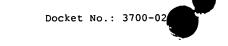6 the earth by a least a predetermined amount.

1 17. A constellation according to claim 10, wherein the
2 communications equipment on each of the plurality of
3 satellites is further configured to communicate at
4 frequencies allocated to geostationary satellites.

1 18. A constellation according to claim 10, wherein each of
2 the plurality of satellites has a power system configured
3 to generate a first amount of power when the communications
4 equipment on the satellite is enabled and a second amount
5 of power more than the first amount of power when the
6 communications equipment is not enabled, to store excess
7 power generated when the communications equipment is not
8 enabled, and to enable the communications equipment with
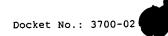9 both the stored excess power and the generated first amount
10 of power.

1 19. A method for satellite communications, comprising:
2   orbiting a plurality of communications satellites
3 about the earth, the orbits having apogees and perigees;
4 and
5   enabling each of the plurality of communications
6 satellites to communicate only during a predetermined
7 portion of the orbits proximate to apogee;
8   wherein the orbits of the plurality satellites form at
9 least two ground tracks on the earth displaced from each
10 other longitudinally, each of the ground tracks repeating
11 daily and having a number of active arcs, each active arc
12 corresponding to the portion of the orbit of each satellite
13 during which the communications equipment on the satellite
14 is enabled to communicate; and
15   wherein the satellites are orbited such that at all
16 times at least two of the satellites are in each of the

17 active arcs and such that at all times each of the
18 satellites in any one of the active arcs is separated by at
19 least a predetermined angle, as observed from the earth,
20 from each other satellite in the same active arc and from
21 any satellite in any other active arc.

1 20. A method according to claim 19, further comprising:
2 configuring the orbits of each of the plurality of
3 satellites to have a mean motion that is one of 2, 3 and 4.

1 21. A method according to claim 19, further comprising:
2 configuring the orbits of each of the plurality of
3 satellites to be inclined at critical inclination.

1 22. A method according to claim 19, further comprising:
2 configuring the argument of perigee of the orbits of
3 each of the plurality of satellites to be in the range of
4 195 degrees to 345 degrees for apogees in the northern
5 hemisphere and in the range of 15 degrees to 165 degrees
6 for apogees in the southern hemisphere.

1 23. A method according to claim 19, further comprising:
2 configuring the orbits of each of the plurality of
3 satellites to have throughout its orbit an orbital height
4 lower than a height necessary for geostationary orbits.

1 24. A method according to claim 19, further comprising:
2 configuring the orbits of the plurality of satellites
3 such that the satellites are equally spaced in mean anomaly
4 within their respective ground tracks.

1 25. A method according to claim 19, further comprising:

2 configuring the orbits of the plurality of satellites

3 such that the portion of the orbits during which the

4 satellites are enabled for communication, is separated from

5 the equatorial plane of the earth by at least a

6 predetermined amount.

1 26. A method according to claim 19, further comprising:

2 communicating with the plurality of satellites at

3 frequencies allocated to geostationary satellites.

1 27. A method according to claim 19, wherein each of the

2 plurality of satellites has a power system generating a

3 first amount of power when the communications equipment on

4 the satellite is enabled and a second amount of power more

5 than the first amount of power when the communications

6 equipment is not enabled, and further comprising:

7 storing excess power generated when the communications

8 equipment is not enabled; and

9 enabling the communications equipment with both the

10 stored excess power and the generated first amount of

11 power.